



The  
**Imperial Forestry Institute**  
University of Oxford

TWENTY-SECOND ANNUAL REPORT  
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# UNIVERSITY OF OXFORD

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## TWENTY-SECOND ANNUAL REPORT OF THE IMPERIAL FORESTRY INSTITUTE ACADEMIC YEAR, 1945-46

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THE year was marked by the beginnings of the return to more normal conditions on the cessation of hostilities—but only the beginnings. There was still only a very small field of science graduates among whom to recruit Scholars for the Colonial Forest Service and only two were selected. Young men continued to be called up for national service and but few were released from the Forces in time for the beginning of the academic year. Actually a small number of ex-service men arrived during the course of the Michaelmas Term or in Hilary Term, and two Government Scholars from India joined at the same time. Only two Colonial Forest Probationary Officers (from Sierra Leone and Trinidad) attended the Institute to complete their degree course and sit for the Final Honour School: but they were joined by two others from the Sudan and Kenya who were already qualified for war degrees, and by a Polish student, formerly of Warsaw University. Other students included four from Australia reading for B.Sc. or the Diploma, and three officers of the Colonial Forest Service undertaking post-graduate courses. During the year, three students obtained the Honours degree, one the Diploma, and one (Dr. J. Beard) the D.Phil. degree for a thesis entitled 'Natural Vegetation of Trinidad.'

A significant innovation was the attendance of a class of junior Indian Forest Service officers deputed by five of the Provincial Governments of India and one Indian State (Hyderabad) at an eight-month course specially organized for them. This course was run largely on the seminar basis though the group attended some of the more advanced lectures, etc., of the other classes, and the Continental tours mentioned later formed an important feature. Each student also made a special study of a selected subject under the supervision of a member of the staff, so that they received that individual attention which is an essential part of the Oxford system. Arrangements have been made under which this course should be run annually.

For the first time since 1939, it was possible to organize instructional tours on the Continent. Colonel Lloyd fortunately had numerous contacts in France and Switzerland, and so was able to arrange a French tour, primarily for the Indian students, at Easter, and it was repeated in part in July for a second group, the Indian and some of the Colonial officers also visiting the Jura and Vosges regions and Switzerland. These tours provided special opportunities of studying forest management, silviculture, forest engineering and utiliza-

tion, which have been lacking during the war. Dr. Jones accompanied Colonel Lloyd on the first tour and took over charge of the second while Colonel Lloyd took the tour in South-east France and Switzerland. In July, the Professor took a large party, twenty-five in all, of senior students to Sweden. Mr. Brasnett joined this tour whilst Dr. Handley travelled with the main party part of the time but was mainly engaged in making contacts in connection with the research work of the Institute. The success of all these tours was largely due to the extremely cordial and co-operative reception given by the Forest Services of the countries visited and the Institute is greatly indebted to them. The Director-General of Forests in Sweden detailed a very competent officer to organize the tour and accompany the party, and we also had similar help in France.

Working-plan work and a Management exercise were carried out at Easter in High Meadow Woods, and subsequently the Professor took a small party on a tour of places of special forestry interest in South Wales, *viz.*, Tair onen Nursery, Pembrey sand-dune afforestation, Brechfa Forest (plantation work), Radnor and Mortimer Forests (Larch provenance experiments). During the Summer Term excursions were made to the sawmills and workshops of Messrs. Gliksten and Son (Stratford, London), the Woburn estate, Hazelborough Forest, Mr. Workman's sawmills at Woodchester, the G.W.R. Timber Yards at Swindon, Windsor Forest, Alice Holt Forest and the Forest Products Research Laboratory at Princes Risborough. The Institute is greatly indebted to the Forestry Commission and to the owners of estates and sawmills visited for the facilities given for making these visits possible and the great help in demonstrating and explaining points of interest. The grateful thanks of the Institute are also due to the Director and Staff of the Forest Products Research Laboratory for undertaking the new ten-days' course at the Laboratory during a very busy period of re-organization and shortage of staff and for giving much help in connection with the special studies of some of the students on the Utilization aspects of forestry.

It had been hoped that working plans for the Wytham Woods and Bagley Wood might have been completed during the year, but pressure of other work has caused delays. However, useful preliminary work was done in Bagley by one of the senior students, and Dr. Jones was able to carry out a silviculture reconnaissance in Wytham which will provide the basis of the future management. Meanwhile, a forester and two permanent woodmen have been employed in Wytham, a nursery has been laid out, and two areas wire netted, one for new plantation work and the other for regeneration in the woodland area. The necessary nursery stock has been raised in Kennington by the Forestry Commission Forester, Mr. Gray, who has been very helpful throughout. Wytham also provided the space and material for various minor investigations by senior students and is already proving a very valuable addition to our instructional facilities.



Research work at the Institute has continued on most of the problems in hand last year, notably those in the pathological, ecological and entomological fields done largely in co-operation with the Forestry Commission and in Commission forests, and Dr. Chalk's wood anatomical work in collaboration with Royal Botanic Gardens, Kew. There have in addition been two important developments in new directions. With the appointment of Mr. J. J. MacGregor, the Institute once again, after an interval of sixteen years, has a member of its staff giving full time to teaching and research work in Forest Economics. Here, too, the object is to study problems of special interest to the Forestry Commission and to private forestry in this country. Mr. MacGregor has so far given most of his time to a careful study of the present general position and in making contacts to discuss the subject with interested persons to decide on the most promising lines of work. This has led to certain decisions and exploratory work to be described below.

The other development has been the appointment of a group of three research workers (who like the rest of the Institute staff assist with teaching work in their respective fields) to work as a team on the fundamental aspects of the relation between tree growth and the soil, linking on the one hand with the work of the other staff members who deal with silviculture, general pathology, mycology and entomology, and on the other hand with the technicological and largely *ad hoc* research of the Forestry Commission staff. The team at present consists of Dr. Handley, Dr. Leyton and Mr. Dimbleby, for microbiology, tree physiology and ecology respectively, and the Institute is fortunate in having been able to secure the services of scientists so well qualified for the work envisaged. It is hoped that it will be possible later to add a fourth member for the physico-chemical side and that one or more research assistants may be able to take up other aspects such as the soil fauna work which is described later. Very valuable help has been given as in previous years, by Mr. C. G. T. Morison, University Reader in Soil Science, and his staff, particularly in lectures on tropical soils and field demonstrations and exercises on methods of soil survey in relation to vegetation and tree growth.

The new University Lecturer on Design and Analysis of Scientific Experiment gave a course of lectures on his subject which was attended by many of the staff and students, and it has been most helpful to the staff to be able to discuss their statistical problems with him. Our own statistical section was kept very fully occupied during the year.

Progress with library referencing work has been marked enough to merit special mention here. It is mainly due to the creation of a new post for the care and maintenance of the indexes. By efficient organization and the temporary employment of several additional workers at last available, Mr. Hemmings has been able to clear off to a large extent the heavy arrears of work. Co-operation with the Imperial Forestry Bureau has continued to run smoothly; Dr. C. F. C.

Beeson has continued to act as Director as it has not yet been possible to appoint a permanent successor to Mr. Sisam, who left in November, 1946.

An outside development affecting the Institute is the decision of the Forestry Commission to set up a new Research Centre in Alice Holt Forest near Farnham, Surrey. This will involve the termination of the arrangements under which the Assistant Pathologist and Assistant Entomologist were attached to the Institute, whilst it seems likely that the Research Officer for England and Wales will no longer have his headquarters here. It is felt that both the Institute and forestry research will lose by this step, which has apparently been decided on other grounds. The Commission have, however, agreed to keep one of their research staff at Oxford, who will act as liaison officer: he will also control Kennington Nursery, which is to be maintained for research work.

In July, the Institute was visited by members of the Royal Society Empire Scientific Conference and also by the Review Conference of the Imperial Agricultural Bureaux organization.

Considerable progress can be reported on the building of the new Institute despite continued shortage of labour, but it is obvious that it cannot be completed by July, 1947, when the Fifth Empire Forestry Conference will be held in England, partly in Oxford. Meanwhile, the pressure on accommodation is extreme, and it is totally inadequate to meet even elementary requirements of staff and students. Frequently one part of the work has to be closed down because the floor, bench or table space is required for another part: we really have no teaching laboratory, and no reading room though the library can only accommodate ten students, and we have no room suitable for discussions which have become an important part of our teaching system. Basements have been pressed into uses for which they were not intended and are not suited, and the larger rooms have been partitioned or have to be shared without even that adaptation.

There has been some increase and re-organization of the junior technical staff. A post of Head Laboratory Assistant has been created and filled by the promotion of Mr. F. H. Jones. It has also been found desirable to have a separate workshop assistant and the post has been filled by one of the staff who has been away during the war serving in the Army. Several new laboratory assistants have been engaged, mainly with the new members of the staff. Two former members of the staff have returned to new assistant's posts in the Economics and Botany sections. Excellent work has been put in by these assistants generally, though naturally there have been one or two misfits among the new ones coming straight from schools.

The financial position is satisfactory. The Forestry Commission have agreed to contribute £16,250 over the five years 1946/7 to 1950/1. Nearly all the appointments approved under the post-war policy have been made. Both the Colonial Office and the Forestry Commission are contributing the amounts actually needed during the year out of the total grant for the quinquennium; these amounts



are less than the annual average, as expenditure will rise during the period. The future position is, however, impossible to forecast until a decision is reached on the new salary scales for University lecturers and Demonstrators and what grant will be made in future to the Department by the University to cover the increase in costs since 1939.

The Professor made an exploratory tour in Sweden in the Long Vacation to make contacts with Swedish foresters and their teaching and research organizations with a view to deciding whether it was possible and desirable to recommence Continental instructional tours. He received a most cordial reception and decided that a tour should be arranged for 1946. He was also invited by the Director-General of the U.N. Food and Agriculture Organization to serve on the Standing Committee for Forestry and Forest Products which was holding its first meeting in Oslo in September, 1946: the invitation was accepted. Colonel Lloyd accepted an invitation to serve on the E. Regional Committee of the Forestry Commission. Whilst these committees make demands on time, they are helpful to the Institute through the contacts they involve.

## SILVICULTURE

### *Teaching*

Dr. E. W. Jones gave the usual courses in Silviculture and Forest Ecology together with field demonstrations in Britain and on the tour to France. A special course in experimental methods was also given to the Indian Forest Officers.

### *Research*

Further work has been done by Dr. Jones on the silviculture of oak, and on the completion of other studies, several of which it is hoped to get written up during the coming year.

Mr. Day has completed a paper on 'The correlation between height growth and soil depth and the topographical factors, elevation, aspect and slope,' and submitted it for publication in *Forestry*. A considerable amount of statistical work was carried out under Mr. Day's direction on the correlation between change in elevation and height quality of crop, and between total height growth and current height increment. The aim has been to gain understanding of criteria by means of which growth may be forecast. This applies especially to those cases in which disease is present as debility rather than obvious breakdown of tissues.

### *Forestry Commission*

Mr. R. G. Sanzen-Baker, Forestry Commission Research Officer for England and Wales continued to be attached to the Institute, together with Mr. M. Nimmo (who was appointed as Assistant Research Officer after the end of the year).

There has been considerable co-operation on research projects with various members of the Institute staff, notably with Mr. W. R. Day and the Ecological research team, and facilities have been afforded to various students making special studies of silvicultural problems. In collaboration with Mr. Day, a summary report on the European Larch die-back investigation was submitted to the Forestry Commission; the work of collecting and analysing data relating to this project continues, however, and considerable progress has been made with the classification of the data on punched cards.

The forest nurseries at Kennington and Bagley Wood have, thanks to the kindness and co-operation of St. John's College, continued to be used for research purposes. Also, further sowing experiments have been carried out in the new woodland nursery in Wytham Great Wood. The principal theme of the nursery experiments has been the improvement and maintenance of soil fertility. The aim is not only to produce one-year seedlings of a size capable of being handled easily for lining out, and in some cases for planting in the forest, but to ensure that such seedlings and transplants are well balanced as regards root and shoot and properly equipped from the mycorrhizal standpoint. Dr. M. C. Rayner, of Bedford College, London, and Dr. I. Levisohn have actively co-operated in this work.

The use of composts prepared from readily-available waste materials such as bracken, straw, sawdust, molinia grass and brewery-hop waste continues to play an important part in the nursery work and research into methods of production, and subsequent trials have continued with excellent results.

The Sub-Committee on Nursery Nutrition of the Forestry Commission Research Advisory Committee has continued to direct a series of critical experiments in the three nurseries, and these are producing very valuable data relating to seedling and transplant nutrition. Dr. A. M. Crowther, of Rothamsted Experimental Station, and some of his colleagues, have been closely associated with this research.

Work on vegetative propagation of conifers has been restricted to a few trials with Norway and Sitka spruce and the two Sequoias, *S. sempervirens* and *S. gigantea*. Kennington Nursery also carries a very considerable collection of poplar hybrids which are propagated annually from cuttings for experimental planting.

Portable seed boxes continue to find favour for trials of various soils and treatments. Quite a range of species is being raised in this manner and provides good demonstration of the effect of artificial watering and early sowing.

Beech occupies the field for provenance studies at the moment and stock is available for comprehensive trials in the 1947 planting season.

The nurseries and experiments in progress were as usual valuable for instructional purposes and demonstrations to students were arranged by the Forestry Commission staff as required, Mr. Gray's



help at Kennington Nursery and in Bagley Wood being particularly appreciated.

### *Other Work*

Dr. E. W. Jones has given considerable time to field work in the Wytham Woods. He also assisted the Forestry Commission in the preparation of a Guide to the Forest of Dean, and the Wild Life Special Committee.

A short paper was read by Mr. Day at a joint meeting of the Ecological Society and the Royal Meteorological Society, at which the subject 'Ecology and the Study of Climate' was discussed.

## SOIL ECOLOGY

During a considerable part of the past year Dr. W. R. C. Handley, Dr. L. Leyton and Mr. G. W. Dimbleby have been engaged on fundamental investigations into the relationship between tree growth and the soil complex, beginning with a survey of the numerous possible fields of investigation in order to crystallize a working hypothesis for the experimental approach to the problems involved.

In this connection visits have been made to Allerston Forest in East Yorkshire and Kielder Forest in Northumberland with a view to the establishment of a field laboratory for the collection and preliminary preparation of experimental material, and as a base for field measurements of various soil characteristics. Allerston Forest was finally chosen as it has many series of experimental plots of different kinds situated in various parts of the forest that are comparatively easily accessible. The area consists largely of moorland plateau with a number of soil and rock types, including deep peat containing well-preserved pine stumps, estuarine clays, moorland with pan formation, oolites, cornbrash, etc.

It is particularly suitable for fundamental investigations since the undisturbed moorland appears to be an almost impossible environment for successful and vigorous tree growth, whereas the changes ensuing in the soil and ground vegetation on cultivation appear to allow of rapid establishment and vigorous growth of trees, especially when certain types of tree seedlings are used. It is hoped that with the help of the Forestry Commission this field laboratory will be in a usable state by the spring of 1947.

With a view to examining various problems connected with transplanting, establishment and regeneration, and more especially hardwood regeneration, a visit was made to the New Forest where the Forestry Commission experiments on the establishment of transplants on the difficult areas at Wareham Heath and the production of seedlings under such conditions with the aid of various composts and other treatments, were inspected.

A number of visits have been made for the purpose of an exchange of views on problems of mutual interest. Among these a discussion on soil problems in general with Professor W. H. Pearsall proved

very helpful and stimulating. Soil physics problems, especially water relationships, were discussed comprehensively with Dr. Schofield, of Rothamsted Soil Physics Department.

At Rothamsted Experiment Station, the spectrographic equipment for the estimation of mineral elements was examined and various microbiological problems were discussed with Dr. H. G. Thornton. Subsequently the Macauley Institute at Aberdeen was visited for the purpose of further investigating the methods of spectrographic estimation of mineral elements, especially the so-called trace elements. Much valuable information was given by Dr. R. L. Mitchell, and as a result of this visit it was decided that it is not practicable, at least at the present time, to undertake the spectrographic investigation of trace and other mineral elements in this department.

Dr. Handley visited various centres in Sweden. Although it was not possible to contact all the workers in this field whom it was originally planned to meet, the following were visited. Dr. E. Björkman of the Statens Skogsförsökingsinstitut in Stockholm, who formerly worked with Professor Melin on mycorrhizal problems, and is now working on mycological problems concerning timber decay and the parasitic attacks on pine seedlings by the snow fungus, which are of more immediate application to forestry practice. He is most anxious to ensure a continuous exchange of views between workers in the various mycological fields in this country and Sweden. Dr. L. G. Romell, of the Statens Skogsförsöksanstalt in Stockholm, who is interested in problems connected with changes in the humus layers of the forest floor such as the changes brought about by the activities of the so-called white-rot fungi on the various organic complexes of humus. His very interesting field experiments were visited dealing with the effects on regeneration of removal of surface vegetation by application of sodium chlorate; of removal of root competition by trenching; and of addition of mineral nutrients to areas of primeval forest. All these experiments are in a region where tree growth is very slow and regeneration very difficult. Professor E. Melin, of the extremely well-equipped Institute of Physiological Botany in Uppsala, is now very interested in the antibiotics present in freshly-fallen litter from forest trees. The opportunity was taken of discussing with him the various techniques and methods used in the experimental investigation of mycorrhizae and it is interesting to note that he intends to make use of radioactive and isotopic materials, in an attempt to throw light on the physiological significance of the tree-fungus association, as soon as the equipment is ready for use. Professor H. Burström, of the Botany Department in Lund, is now working on fundamental problems connected with root respiration. Discussions were chiefly concerned with various physical and chemical methods used in plant physiology and his work on the movements of mineral nutrients in trees. With Professor Sante Mattson, of the School of Agriculture in Ultuna, were discussed many problems concerning soil chemistry, such as base exchange and the changes



occurring during litter decomposition, and problems concerning the physical properties of soils, such as porosity and soil atmosphere.

Although experimental work on the microfauna of forest soils was commenced last year it has not been possible to continue this phase of our activities for the present.

Experimental work along several lines, in all the three fields of ecology, plant physiology and microbiology, has been commenced; but it is not progressing as rapidly as could be wished owing to the great difficulty in obtaining delivery of supplies and equipment. Among the activities in these fields, the following have the most attention.

*Ecology* (G. W. Dimbleby). Attention has been concentrated on the perfection in the laboratory of methods for the assessment of the more fundamental edaphic factors. The tree is affected by these factors under field conditions, and any tests and measurements should be so devised that the natural state of the habitat is disturbed as little as possible. Obviously this ideal is not completely attainable, but it was considered that some of the existing methods involve an unnecessary disturbance of the soil. In particular, therefore, special study has been made of the measurement of the following properties:—

(1) Moisture relationships: A method for the field measurement of soil suction is in the experimental stage. Suction is considered to be of greater significance to plant growth than the percentage moisture value usually adopted.

(2) Soil porosity: This is inextricably bound up with moisture relationships. Reliable methods of measurement are inevitably complex, and involve unnatural disturbance of the soil. A new method is being tested, which may prove valuable in certain types of soil.

(3) pH: Measurement by means of soil suspensions and indicators is open to serious criticism. The use of the glass electrode enables spot field measurements to be made, though there are objections to this method also which call for further experimental work.

(4) Eh: The significance of Eh as an ecological factor is still very incompletely understood, but in view of modern theories of mineral uptake and microbiological activity, it must be considered of potential ecological importance. Work has been carried out in an attempt to obtain constant and reproducible measurements on soils, in continuation of pre-war work in this field.

*Tree Physiology* (L. Leyton). From a physiological point of view, study of the problems involved in the tree soil relationship almost invariably lead to the problem of nutrition and the effect of soil characteristics on the uptake of mineral nutrients by the roots. Properties like pH, Eh, aeration and mineral and water content represent some of the main factors influencing tree growth with respect both to seedling establishment and subsequent development. In view of the wide field of investigation involved, immediate attention has been directed towards a study of the nutritional status of the tree as deter-

mined by mineral analysis of needles and seedlings and investigations into the influence of the soil atmosphere on root metabolism.

A number of analyses have been made of needle samples from representative trees and seedlings showing different degrees of growth vigour, with a view to investigating possible correlations between mineral concentration in the tissues (e.g. Ca, Mg, K, N, P, Fe, Mn) and growth. The results obtained so far suggest that this technique shows promise as a practical procedure for investigating the nutritional status of the tree with particular reference to mineral deficiencies and toxicities. In parallel with this work analyses of soils have been made to determine the effect of soil mineral content on tree nutrition.

Investigations of a more fundamental nature have been studied and planned to deal particularly with the influence of the soil atmosphere on root respiration and growth. Techniques for the measurement of the composition of the soil atmosphere, the oxygen supplying power of the soil environment and the intensity of root respiration under different conditions are being worked out but are still in the preliminary stages.

In view of the relationship between root respiration and mineral uptake, the varying susceptibility of the different tree species to soil characteristics like aeration, is a factor which necessitates more fundamental research than has hitherto been made and which forms a common ground for ecological studies. Such investigations involve a study of the relevant soil characteristics in the field as related to growth and distribution of species and experiments in the laboratory under controlled conditions.

*Microbiology* (W. R. C. Handley). As far as microbiology is concerned in tree/soil problems, the emphasis will, at any rate in the early stages, be mainly on mycorrhizal associations.

One of the first points to claim attention is the isolation and identification of mycorrhizal fungi. The isolation of many mycorrhizal fungi in the past has proved a very difficult problem perhaps because of inadequate knowledge of fungal nutritional requirements, especially of the more exacting fungi. The identification of fungi isolated from mycorrhizae is largely dependent on resynthesis, under aseptic conditions, of an association morphologically similar to that obtained with mycelium and sporophores. This is an exacting and time-consuming process and it would appear that biochemical and other methods of identification may be more satisfactory from many points of view.

Very little appears to be known concerning the metabolic processes of mycorrhizal fungi and more particularly the processes concerned with the infection of tree roots by the fungi. It would also appear important to determine the effect of variations in the physical, chemical and biological characteristics of the soil environment on the infective processes of mycorrhizal fungi in particular and their metabolism in general. Such knowledge should be of considerable



help in understanding the significance of the association as a whole. The elucidation of the significance of the mycorrhizal association should be greatly facilitated by the use of radioactive material.

From a microbiological point of view, a study of the effects of variations in the biological characteristics of soils on the metabolism of mycorrhizal fungi involves an investigation of the influence of non-mycorrhizal soil fungi and other micro-organisms on mycorrhizal fungi from the points of view of essential growth factors on the one hand and antibiotics on the other.

It is hoped, as soon as opportunity allows, to initiate studies on the ecology and physiology of the microfauna of forest soils. Variations in the microfauna might be correlated with differences in the microflora and tree species characteristic of individual soil types.

## FOREST BOTANY

Mr. A. C. Hoyle, Curator of the Forest Herbarium, continued to work at the Institute and to undertake teaching and supervisory work needed by the students of all categories.

*Herbarium* accessions during the year totalled some 840 specimens, of which 573 were for identification. Mr. H. L. Dunkley (technical assistant) returned from war service and improved progress was made in mounting and filing, and when he was detailed at the end of the year to assist Mr. Brenan with the Identification Service, an additional junior assistant was employed. The number of specimens poisoned and mounted rose from 800 last year to 2,478, and many specimens in the Herbarium have also been repaired. Several thousand specimens were filed in the Herbarium during the year. The satisfactory total of 630 duplicate specimens, labelled and accumulated during the war years, was dispatched to European and American herbaria, as against 89 received.

A good beginning has been made in re-organizing the filing system of the Section, perforce neglected during the war. Mr. C. W. Bond was appointed early in July as typist-cataloguer for this purpose and to take charge of the correspondence, his services and pay being shared between the Forestry and Botany Departments.

*Lectures and Demonstrations* were given to a class of small numbers of Colonial and Indian Forest Officers. Mr. A. P. D. Jones and Mr. R. W. J. Keay continued to work on the Nigerian flora in the Herbarium during part of the Summer Vacation, 1945. Following a request from a timber firm for information on the identification of timber trees in West Africa, one of the firm's employees was given elementary instruction.

Lectures were given as usual on Tropical Ecology, and the principles and methods of soil vegetation survey and record were explained to a class of Indian Forest Officers and other officers on leave, and then tried out by them on a selected hillside in Wytham Wood under the supervision of Mr. Morison, Mr. Brenan and the Curator.

*Research.* The Curator has prepared for publication the results of research, partly with Mr. A. P. D. Jones, on the confused taxonomy and nomenclature of *Lannea Barteri* and related species. Progress continues with the Curator's revision of the genus *Brachystegia*, which he hopes to complete next year. An advance copy of an account of the soil and vegetation of the South-Western Sudan, to be called 'Tropical Soil-Vegetation Catenas and Mosaics,' was prepared for the Sudan Government by the Curator. This account, written in collaboration with Mr. Morison and Dr. Hope Simpson, is now being finally revised by the latter before being submitted for publication.

*Visitors, etc.* Collaboration by letter with Professor Pellegrin at the French Academy of Natural Sciences has produced valuable results in the naming of critical species. Dr. Normand, of the Academy, while working here on Wood Structure, consulted the Herbarium on several occasions and at his request Professor Pellegrin presented the Curator with a valuable collection of separates of his publications. A short but welcome visit was also paid by Professor Robyns, of Brussels; the cordial relations started with him by Dr. Burtt Davy have continued to be a source of great assistance in the work of the Section, particularly in the Curator's work on *Brachystegia*.

Mr. A. H. G. Hill, Director of the East African Agricultural Research Institute, Amani, Tanganyika Territory, paid a visit to the Herbarium early in the year.

*Check-lists.* Mr. J. P. M. Brenan was engaged in the final work on the check-list for Tanganyika Territory and the first parts of it are in press; some important sets of specimens from the territory collected by Mr. P. J. Greenway enabled a good deal of additional information about little-known woody species to be incorporated. The study of various groups from South Tropical Africa in connection with the proposed check-list for Northern Rhodesia was continued.

A valuable account of the phytogeography and ecology of the woody species of Palestine by Dr. M. Zohary was received for preliminary comment and criticism, with a view to its publication by the Institute.

*Identifications.* About 950 determinations in all have been made by Mr. Brenan during the course of the year. The principal work has been on the large and valuable collections made by Messrs. A. P. D. Jones and R. W. J. Keay and their collaborators in Nigeria, amounting to over 700 numbers, of which nearly 600 have been named here. Smaller collections from Uganda (Mr. H. C. Dawkins, communicated by Dr. W. J. Eggeling), Tanganyika Territory (Mr. P. J. Greenway, Mr. L. T. Wigg), Zanzibar (Mr. J. H. Vaughan), and Southern Rhodesia (Mr. G. M. McGregor) have also been determined. In addition various, usually isolated, specimens of cultivated trees in this country have been sent for naming. Accessions of new material necessitate constant checking and revision of older material



in the Herbarium, and numerous alterations and corrections become necessary. Several visits were made to Kew in connection with identification of specimens.

*Special investigations.* Largely arising out of the routine identifications mentioned above, special attention has been paid to certain genera, and our material of the following has been revised, either wholly or in large part:—*Albizzia*, *Annona*, *Cedrela*, *Dalbergia*, *Dalbergiella*, *Diospyros*, *Eriocoelum*, *Hermannia*, *Mansonia*, *Memecylon*, *Okoubaka*, *Swartzia*, *Toona*; papers on *Memecylon* and *Mansonia* are awaiting publication. Work on *Cola*, especially the East African species, has been continued, and a first paper on the genus is awaiting publication.

Numerous requests for information and advice on the taxonomy and ecology of tropical plants were received, especially from Nigeria (Messrs. A. P. D. Jones and R. W. J. Keay) and Tanganyika Territory (Mr. P. J. Greenway). Particularly noteworthy were those about the Carnaúba Palm (*Copernicia cerifera*) in connection with its possible introduction to the Sudan, and on the taxonomy of the climbing palms of West Africa.

A memoir by Dr. J. S. Beard on the vegetation of Trinidad, and another on the forests of Central and Southern Ethiopia by Mr. W. E. Millar Logan were prepared for publication and seen through the press, the latter in collaboration with Mr. A. C. Hoyle.

Arising out of some specimens brought by Mr. W. J. Lambert, a note was prepared on the monoecism in *Myrica Gale*.

## PATHOLOGY

Mr. W. R. Day continued in charge of the Section with Mr. F. H. Jones as senior assistant and Mr. D. Barrett as junior assistant. Both the latter have been engaged in field work during the year.

### Teaching

The usual courses of instruction were given in forest hygiene and pathology.

### Research

(a) *Butt Rot of Conifers.* This work was not quite finished but it has been carried far enough to show that it will, at the most, be possible to draw only very general conclusions as to the influence of particular soil characteristics on butt-rot.

(b) *The height increment curve and root development in relation to soil type.* A certain amount of evidence has accumulated during the past few years to show that the shape and degree of variation in the course of the height increment curve reflects the character of the soil, often to a very considerable extent. The limited amount of root excavation which has been possible, in conjunction with that done in the past by others, shows that the vicissitudes of root development

are also largely reflected by the increment curve and determined by the character of the soil profile. It is proposed to ask for the co-operation of the Forestry Commission in connection with this problem and especially of their Sample Plot parties which have exceptional opportunities for collecting increment data.

(c) *Die-back and needle cast of Corsican Pine.* The work on this has been summarized in part in a paper published in *Forestry*. A certain amount of experimental freezing is needed to check some of the tentative conclusions and this will be carried out as soon as possible. It is planned to publish an account of the anatomical characteristics upon which depends the diagnosis of frost injury in Corsican pine, as well as in other conifers, as soon as the necessary diagrams and photographs can be finished. There is still a very great deal of research needed before the various diseases of this and other species of pine are fully understood.

(d) *The Dying of Scots and Corsican pines in East Anglia.* A small working party collected data in September, 1945, regarding the serious dying of pines which is taking place in East Anglia. The party consisted of Mr. P. C. Gough, Research Forester, Forestry Commission, Mr. F. H. Jones and Miss A. E. Day. A report has been sent to the Forestry Commission during the year on the results of this work and subsequent examination of material and cultures in the laboratory. Strong evidence is brought forward that the fundamental causes of the mortality are to be found in the very great variations in soil conditions, and especially in the balance of water and air in various layers in the soil. Part of the evidence lay in the discovery of abnormal zones in the root wood of affected trees; a short illustrated reference to this has been given in a letter published in *Nature*. Another part of the evidence lay in the nature of the height increment curves for pines in and near the affected parts of the plantations. *Fomes annosus* was found fruiting on many trees and was isolated easily from them. A species of *Phytophthora* was also isolated. Further research is being carried out by the Forestry Commission staff and also from Cambridge University.

(e) *The dying of Sitka spruce in Llantrissant Forest.* Mr. T. R. Peace reported this as being probably a case of *Phytophthora* infection. The affected trees were examined in July and a *Phytophthora* was isolated from an early stage of the disease. This was an interesting case of a group of trees making good early growth on a soil of a very ill-drained nature, but subsequently becoming diseased. As in East Anglia, the physical conditions of the soil are to be regarded as providing the adverse factors of fundamental importance, the fungus parasite depending on these. There was no evidence of the presence of *Fomes annosus* on these trees though many other fungi occurred in the older parts of the dead bark. This superabundance of fungi in the dead tissues complicates to some extent the isolation of those which are acting as parasites. It is plain that a careful study under controlled conditions is needed to make possible a satisfactory



interpretation of the sequence of events which occur in these cases of root disease.

(f) *The silviculture and pathology of European larch.* This work is being done in collaboration with Mr. Sanzen-Baker. The analysis of data is being proceeded with, with the help of Mr. Zukowski, to whose energy and enthusiasm in a very difficult problem much credit is due. Mr. Sanzen-Baker has written an account for popular reading of the results obtained to date in the sample plots of larch of different provenances laid down by the Forestry Commission, and a similar account of the general silviculture and pathology of European larch is being prepared in collaboration with him.

Three new pieces of work have to be mentioned. Firstly, opportunity was taken of the presence in Kennington Nursery of European larch of a large number of different provenances, to make trials of hardiness in the refrigerator of seventeen of these and also of two provenances of Japanese larch. Preliminary assessments show that significant differences between some of the provenances will appear. Secondly, observations have been made for four years since 1942, at Myndd Ddu Forest in the Black Mountains on the Welsh border, as to the incidence of insect and fungus diseases and also frost injury, on European larch in the older part of that forest. These observations show that in this place there is no true correlation between the incidence of larch canker and die-back and the occurrence of insect pests such as the larch shoot moth, or leaf miner or the leaf-sucking *Adelges*. Whilst canker and die-back have occurred only to a slight extent, infestation with the larch shoot moth has been severe in some places. Moreover, these severe infestations have occurred in situations in which the canker and die-back have occurred only very slightly. Thirdly, observations were made in the Easter vacation on the incidence of canker and die-back and the density of stocking of European larch planted on old oak woodland in Mortimer Forest. This study was made because some practising foresters believe that larch planted on such sites tends to be free from disease. It was found that the disease may be very severe on such sites and that its severity is related to the topographical character of the landscape, as has often been observed in the past. The observations also showed that where European larch has been planted on a favourable soil and in a favourable situation as regards local climate it will, given ordinary care in cleaning, suppress the coppice satisfactorily and produce a well-stocked plantation. If a suitably variable woodland is chosen, it can be shown that the poorer-stocked parts of the plantation occur in those situations which, from their topographical form must have the most severe local climate. These situations are usually in folds or hollows of the hillside, just where the deeper and moister soils occur, and taller and denser larch would be expected. The action of disease reverses the position. It can thus be demonstrated that in one of its aspects, the problem of the failure of the suppression of coppice by an introduced crop is in reality one of the presence of serious disease on the introduced tree.

(g) *Other items.* Isolations were attempted from specimens of beech canker received from two quite different sources. The principle organism isolated was a bacterium which appears in both cases to be similar in type of growth and in morphological character. The existence of a bacterial canker of beech is not improbable and it is proposed to make trial inoculations with this organism to see if it is capable of causing the death of beech bark.

Further reports received during the year continued to show the very severe injury which occurred to some conifers and especially to Sitka spruce by the late frosts in 1945. These reports have come from places as far apart as Devon and the Western Highlands.

Specimens of pine seedlings from nurseries have been examined during the year. These have usually been sent in because of their diseased appearance. *Phytophthora* spp. were isolated in two cases. This type of attack seems clearly often to be associated with late sowing. In other seedlings received the pathological condition seemed clearly to be related to a basically defective physical soil structure which, in some cases may be natural to the site, but in others may be induced by cultivation. In co-operation with other members of the staff and Mr. Gray (Research Forester, Forestry Commission), plans were drawn up for research work in Kennington Nursery directed towards finding an explanation of some of the difficulties which are met with in the maintenance of fertility in forest nurseries.

The small *Abies grandis* plot in Bagley Wood has been declining in health for some time. The root system of one of the larger trees was investigated at the time of the recent thinning. This showed that the limitation in rate of growth and the poor appearance in health, is due in large measure to the extremely poor rooting conditions which exist in the badly-drained sandy clay sub-soil in this plot. A similar investigation was made in one of the 30-year-old Sitka spruce plots which grows on similar soil. This showed a very rapid fall in rate of height increment after 20 years and the same type of root disease in the ill-drained sub-soil as in the *Abies grandis* plot. A rather serious bark-necrosis occurs on some of the *Abies grandis*, the cause of this has not been discovered so far.

## FOREST ENTOMOLOGY

Dr. R. N. Chrystal continued in charge of the Section.

*Lectures and Laboratory Work.* The prescribed syllabus was covered during the Hilary and Trinity Terms. Mr. G. R. Fenton, the senior student who was engaged upon a study of the relation between soil fauna and vegetation types, was obliged to discontinue his studies on his departure for New Zealand. The results of his work will shortly be published and it is hoped that his work will be continued by another student in the near future.

Mr. G. H. Thompson, of the Gold Coast Forest Service, who has been engaged in research work on the ecology of wood-boring

Coleoptera in the Gold Coast, returned to England this summer, and has presented a thesis on his work for the degree of B.Sc.

*Forestry Commission.* A short course of instruction in forest entomology, initiated at the Forester's School, Parkend, Forest of Dean, in 1941-42, and subsequently discontinued owing to the war, was restarted this summer with twenty students in July and August. The candidates will be examined in this subject as part of their final examination for the school certificate.

At the request of the Forestry Commission, two exhibits of forest insects were prepared as part of the forestry exhibits in Kent, and at Bristol.

A talk was given to members of the Short Course for Land-owners organized by the Royal English Forestry Society at Cirencester Park in April, on 'Trapping, and other methods of Forest Pest Control.'

*Research: The Douglas fir Adelges.* A small plot of Douglas fir has been established at Kennington for the carrying out of experimental infection experiments in the Spring of 1947.

Surveys carried out in the Douglas plantation at Tubney during the winter revealed a marked increase in the number of trees falling victims to fungus disease. An interesting feature of the condition of these trees in the early stages of the attack, was their abandonment by the *Adelges*. Comparison with normal trees showed this very well, and the same thing has been noticed in other areas where Douglas in an obvious state of dying-back have been found to be quite free of *Adelges*. The wet conditions prevailing during the season of 1946 have had a marked effect in reducing the predators at Tubney. Surveys of marked trees locating adults and larvae at different levels on the trees, carried on through the spring and summer, have revealed only very small numbers in great contrast to those found in Wales in 1945.

Trees in two areas of the Coed-y-Brenin Forest, North Wales, Ffrid Goch, and Cae Cyrach, have been marked for studies of growth in relation to density of *Adelges* infection.

Two new areas where Douglas fir has been planted, were visited this summer, *viz.*, Okehampton, Devon, and Bodmin Forest, Cornwall. At Okehampton, two areas planted in 1933 and 1935 which had been pruned, were examined. Many of the trees were found to be in a definite state of check, as was clearly shown by the reduced shoot growth 'coupled with subnormal needle development. The general incidence of *Adelges* on the crowns of these trees was negligible, and as there were no lower branches where the insects could mass in numbers, the trees were, for practical purposes, free of attack. Check is, however, obviously still persisting, and must be due to other factors.

In the younger plantations of 1938 and 1939, still in the thicket stage, there was a sufficiently dense attack of *Adelges* to lead one to expect a good number of predators to be present. Surveys



showed that this was not the case, only a few scattered specimens of *Exochomus* and *Adalia* being found. Actually, more predators were taken on isolated old trees of silver fir growing by the roadside nearby, than in the plantations.

The production of winged sexuparae has been very great this season at Okehampton, and young Sitka spruce were found with the needles thickly covered with them, giving a silvery appearance to the foliage. It was hoped that this abundance of the migrants would lead to the finding of galls on Sitka but no sign of past or present gall production was found. Closer examination of the sexuparae also showed that many had died without having laid any eggs.

No evidence of severe *Adelges* attack was found at Bodmin. In the first small area of Douglas fir mixed with oak, the trees were showing great vigour of growth, and no *Adelges* at all. There was no sign of check. In a second area, on a steep hillside, *Adelges* was present, but the presence of fungus was actually more in evidence, and the crowns showed the results of severe wind damage.

*Spruce Aphis*. Attention was drawn to the results of aphis attack in several parts of the country this Summer. Near Holworthy, Devon, one large area of Sitka spruce showed devastating results from the combination of unfavourable site, spruce aphis, and frost, many trees having died. One tree, about 6 ft. in height, had all the needles removed with exception of the leader which, however, had managed to attain a length of about 2 ft.

*Ips typographus* on *Spruce*. The presence of this insect in spruce logs imported from Germany has been reported from several parts of the country during this season. One shipment of logs was examined at Plymouth Docks in July. Many of them were practically unbarked, and the bark was still fresh. There were large numbers of adult beetles, and a lesser number of larvae and pupae. Many other logs had been barked, or partially barked, and their felling date was in any case too old to allow of the bark being fresh enough for the beetles to breed in, so that these logs could be disregarded from the point of view of further barking at the dock side. All practicable steps to minimize the risk of establishment of this destructive insect had been taken, and a watch was being kept to see that in the places to which the logs were being sent further precautions were taken to prevent the beetles from establishing local foci from which spruce woods might be infected.

## MENSURATION AND MANAGEMENT

Courses of lectures and demonstrations were given by Mr. N. V. Brasnett for both first- and second-year students, the latter also being attended in part by Colonial and Indian Forest Service probationers and others. A special study of French working plans was made before the instructional tour in France. Mr. Dimpleby lectured on aerial survey and reconnaissance in the Trinity Term. Practical work for the first-year class included the thinning and remeasurement

of the *Thuja plicata* sample plot in Bagley Wood, and the preparation of Part I of a working plan for 500 acres of High Meadow Woods during part of the Easter Vacation. At the same time the second-year students completed Part II of a working plan and three others carried out a special exercise in High Meadow Woods, designed to present problems of the application of mensuration and management to the forest.

All the students attended study tours in France and Sweden, where management was one of the chief subjects of study. During the Summer Term, two private and two Forestry Commission woods were visited from Oxford.

One Colonial Probationer made a special study of working plans, during which he prepared a reconnaissance report for Bagley Wood and made progress with a plan for a Native Administration Forest Reserve in Tanganyika.

*Research.* One of the Colonial Probationers started a study of the problem of the determination of growing stock and rate of growth in tropical uneven-aged forests in relation to régulation of felling, as the subject for a thesis for the degree of D.Phil., using data obtained from Uganda. He related above buttress increment to breast-height increment in two species and drew up a scheme for classification and remeasurement of trees in sample plots of tropical, uneven-aged forest, which will be of immediate value in Uganda and may eventually prove to be of wide application.

No research was carried out by the staff, but considerable attention was given to the problems of the efficiency of partial enumerations in various methods of sampling. Mr. Finney gave valuable assistance and, in conjunction with Dr. Yates, is pursuing investigations on data obtained from India through the courtesy of Dr. Griffith.

Attention is also being paid to possible modifications in methods of preparation and presentation of working-plan reports to meet the urgent practical needs of British and Colonial foresters. Rapid production of plans which can be executed by agents or locally-trained subordinates who have not received much scientific training must be made possible without too great risk of damage to forest estates.

## STATISTICAL SECTION

Under Mr. Day's direction, Miss Faulkner continued to act as computer throughout the year with great efficiency, but unfortunately she left to take up other work at the end of the year. This will involve a considerable setback to all computation work until a successor is adequately trained.

The work of the Section has been done mainly for the Pathology Section, but assistance has also been given to the Silvicultural Section and in dealing with investigations carried out in collaboration with the Forestry Commission staff. The fact that aid in statistical com-

putation is available has made possible a more efficient approach to research problems, and has proved to be a very great help.

The advice of Mr. D. J. Finney, University Lecturer in Design and Analysis of Scientific Experiment, has been sought on several occasions and has been much appreciated.

## WOOD STRUCTURE

The usual undergraduate and post-graduate courses were given and in addition some special courses were provided for senior students.

In spite of the greatly increased demands of teaching in his own subject, Dr. L. Chalk was able to make much more rapid progress than in previous years with his research on the systematic anatomy of the dicotyledons; the first draft of his part of the work and a large number of illustrations were completed.

For the first time since the beginning of the war new acquisitions have been coming in to the wood collection. The principal new additions were from the following Colonial Forest Departments:—British Guiana (per Mr. D. B. Fanshawe), Nigeria (per Mr. A. P. D. Jones), Palestine (per Dr. A. J. Goor), British Somaliland (per Major P. E. Glover), and Tanganyika Territory; also from Monsieur D. Normand (Ministère des Colonies, France), Sr. D. G. de Almeida (Serviço Florestal, Brazil), the Forest Products Research Laboratory, Princes Risborough, and the Royal Botanic Gardens, Kew.

## FOREST ECONOMICS

### *Teaching*

Following an introductory course in economic theory, the applied course in Forest Economics was given by Mr. J. J. MacGregor to first-year students. For two terms similar courses were given to the Indian graduate students.

### *Research*

After a study and review of some of the relevant literature, a tentative programme of research was outlined. A Woodlands Accounting System has been published as a basis for the detailed study of economic problems in forestry. Several private and college estates have agreed to co-operate in the accounting scheme by providing data under standardized headings. A start has also been made in the analysis of estate accounts with the object of determining the place of woodlands in the general economy of the estates.

Some data were collected on the economy affected by mechanization in large nurseries and it is hoped that similar studies on specific problems may be carried out in future.

At the beginning of July Mr. F. E. Balman was appointed as assistant to the Forest Economist.



## FOREST ENGINEERING AND UTILIZATION

Colonel A. H. Lloyd returned to the Institute in September, after six years' service with the Royal Engineers. From 1939 to 1943 he was Director of Army Forestry Operations in France and in Great Britain, and in 1944-45 he was Chief of the Forestry and Timber Section, S.H.A.E.F.

A full course of lectures in Forest Engineering, including building and road construction, and the preparation of bills of quantities and estimates, was given to senior students including officers deputed from the Sudan and from Kenya. A timber-extraction road project was carried out on the Wytham Estate.

In the Hilary and Trinity Terms a course of lectures in Forest Utilization was given to second-year students and a short course in modern methods of timber extraction was given to seven Indian Officers on deputation and to other officers attending the Institute. Films of timber logging and extraction were shown during the course.

A new ten-days' course in Seasoning, Preservation, Timber Mechanics, Wood Chemistry and general utilization was arranged and conducted in the Winter Vacation at the F.P.R.L., Princes Risborough, and was attended by six Forest Officers, Probationers and Students. A short visit to the Laboratory by a party of Indian Officers and others was also made during the Summer Term. Two students were given individual instruction in particular aspects of Utilization in preparation for a Forestry Diploma and for a special subject thesis.

Three Continental tours were conducted during the year, during which felling, logging and sawmilling were studied. In April seven Indian Officers and four Colonial Probationers and Students attended a three-weeks' tour in France, including the Landes. In June three Forest Officers were taken to the Haute Savoie where a special study was made of extraction by wire ropeways and the control of torrent beds and erosion.

A 15-days' visit to Swiss Forests and sawmills was carried out in June and July with seven Indian Officers. Erosion control and protective works against avalanches were studied and also pasture regulation. The Swiss Federal and Cantonal Forestry Services gave very generous assistance during this visit.

During the Summer Term short visits to study Utilization were made by parties of students and probationers to Messrs. Glikstein's sawmills in Stratford, London, the G.W.R. Timber Yards and Sawmills at Swindon, and to Mr. Workman's sawmills at Gloucester.

## SURVEYING

Mr. O. H. Chilton gave the regular course of surveying in the Michaelmas Term.

## LIBRARY

The year's record is largely revealed by the following statistical data:—

*Accessions*: 1944-45, 1,394; 1945-46, 2,286.

Separate issues of periodicals,	1944-45, 798;	1945-46, 1,173
Books,	„ 46;	„ 60
Other items,	„ 550;	„ 1,053

Increase in number of accessions, 892.

NOTE: The Imperial Forestry Bureau provided 116 items; 336 were obtained by request; gifts totalled 30.

*Loans*: 1944-45, 3,797; 1945-46, 4,001.

To staff,	1944-45, 1,184;	1945-46, 1,958
To Bureau staff,	„ 1,280;	„ 883
To students,	„ 480;	„ 780
To visitors and correspondents,	„ 553;	„ 380

NOTE: While two of these categories increased in number, two are markedly lower than last year.

*Readers in library*: 1944-45, 2,710; 1945-46, 2,913.

Staff, including Bureau,	1944-45, 1,070;	1945-46, 1,154
Students (by reading-periods),	„ ca. 1,130;	„ ca. 1,997
Visitors,	„ 510;	„ 562

*Current periodicals* taken regularly now number 111, seven more than last year. Among the new ones begun are two from China and one from Brazil. *Series*, other than periodicals, increased by 11, including two French, two German, and one Dutch.

*Enquiries by post*, 15. This is the number dealt with; the bulk of enquiries are passed to the Bureau for action. Among these fifteen, one was for a detailed description of our decimal classification, for adoption by a Colonial forestry department; another was for photo-stats of articles in a French periodical for a Danish research station. We were enabled by the mediation of the Control Commission in London to grant a request for publications from a Lithuanian professor of forestry in a Displaced Persons' Camp in the American Zone of Germany; the Department of Botany kindly provided a few items as well for this purpose. A list of about 250 books and other literature was received from the Officer-in-Charge, Forest Research Institute, Kepong, Malaya, representing the chief library items destroyed there during the Japanese occupation; some progress in tracing replacements has been made. We also arranged to collect and dispatch issues of British forestry journals published during the war to the *Ecole des Eaux et Forêts*, Nancy, France.

*Letters and Sales*. Letters received, 681; sent, 911. Sales in the Library amounted to £12 12s.

NOTE: Thanks are due to the Imperial Forestry Bureau for detailing a member of its staff to help in sending out requests for publications, this work having fallen seriously into arrear.

*Staff.* In January a shorthand-typist was engaged, chiefly to deal with requests for literature and with general library correspondence. Mr. E. F. Hemmings was appointed on February 25th, as assistant to take charge of the card-indexes.

*The Library.* A major change in the arrangement of the library took place during the year. This was the alteration of the books, about 5,000 volumes, from the former domestic classification system to the International Decimal Classification. The work of assigning to the books numbers under the new system had already been done by Mr. Spokes, the new numbers having been entered in the hand-list, but not in the books themselves nor on the book index cards. Two part-time helpers handled the latter task, while Miss Guiney, Miss Aspin and Mrs. Lazarus spent many hours, throughout October, November and December, numbering the books. They found that the main classification number, which determines a book's position on the shelves, though theoretically exact, was in many cases unsuitable in practice. After consultation with Mr. Beak, certain conventions were agreed upon whereby books of a general character could be more conveniently fitted into a scheme designed specifically for forestry. During the Christmas Vacation Miss Aspin and Mrs. Lazarus together verified all the book numbers, comparing them with the numbers on the book index cards, and started to move the books themselves. During the Hilary Term moving continued with as much expedition as circumstances allowed, and was completed, with the exception of books on long loan to members of staff, shortly before the end of term. Books out on long loan were afterwards renumbered and labelled *in situ*. New labels for the books on the library shelves were written and pasted on by a part-time worker.

Between August, 1945 and February, 1946, 2,300 cards were incorporated in the current catalogues, about half of which were for new originals, the other half for arrears. During the same period approximately 4,000 cards, relating to 1,000 new items received in the library, were typed. Typing of the reclassified entries for 1936-38, amounting to some 45,000 cards, was completed by the end of October. By that date it had become evident that the staff available (*i.e.* two part-time typists and about half the assistant librarian's time) for dealing with cards for current intake and for arrears was quite insufficient. The situation as regards the catalogues was surveyed, which led to Mr. Hemmings' appointment. He in turn, engaged a staff of part-time workers to deal with the arrears which had accumulated during the war years.

These arrears, amounting to some 45,000 entries, were finally incorporated by the end of July, and the 1934 current catalogue was thereby brought up to date with the exception of entries for 1934-35



which were still under revision, but which it is hoped will be cleared up by the end of 1946; still outstanding, also, are the inevitable queries requiring further investigation.

Current entries dealt with mainly from February amount to 2,936 author cards and 8,805 subject and geographical cards. Most of these were done by the assistant in charge, who had, however, to call in the aid of a part-time worker at times when it became impossible for a single person to cope with the large number of new entries.

The lack of an author index for material prior to 1934 has always been a handicap, especially in answering enquiries, and it was decided that this should be remedied. Two part-time workers spent four months sorting and adding well over 1,000 new entries to the pre-1934 subject index sheets, preparatory to beginning work on a card index of authors. The card index itself was begun early in June, and at the time of writing some 4,000 entries have been typed. It is as yet too early to attempt an estimate of the total number of entries it will contain when complete.

The rapid expansion of the catalogues as the arrears were filed began to cause some concern about accommodation. In February the work was housed in sixty drawers; by July two hundred and ten drawers were required. After considerable search, it was found possible to procure filing cabinets built to a required design, and the work of filing which at one time looked like being held up, was enabled to go ahead.

As the catalogues progressed, they were increasingly used by readers and they attracted outside interest. The British Society for International Bibliography asked for a paper for publication in its Proceedings; this will be read to the Society in October and published in April, 1947.

In July an exhibition of interesting items was displayed on the occasion of the Imperial Agricultural Bureaux Conference. In August the Timber Development Association held a Summer School in the Department, and a number of persons attending it found the library facilities useful. In September the librarian attended a Conference in London sponsored by ASLIB, between special librarians and architects.

Among the visitors welcomed during the year were several prisoners of war from Malaya, including Messrs. Desch, Erskine and Tamworth; MM. Normand and Lafontaine (France); Drs. Meeuse and Varoisseau (Holland); Dr. Robyns (Belgium); Dr. Jäntsi (Finland); Hr. Finn Frost (Norway); M. Donis (Belgian Congo); and Mr. Sale and Dr. Goor (Palestine).

The makers of gifts to the library are warmly thanked for their generosity. In particular we must name the Prisoners of War Section of the Red Cross; the Ministry of Supply; the Society of American Foresters; the Council for Scientific and Industrial Research, Australia; École National des Eaux et Forêts, France; Mr. C. G. Tickle, *Timber News*, London; Mr. J. N. Oliphant; Mr. J. P.

Mead; Prof. V. J. Chapman; Señor D. S. de Almeida; Dr. Kissin; Mr. H. L. P. Walsh; Dr. W. Robyns, Jardin botanique de l'Etat, Brussels; Mr. W. P. K. Findlay; Major C. V. Wallace; Mr. C. Elton; Professor Champion; Dr. Chalk; Mr. J. J. MacGregor; Dr. W. R. C. Handley; and Dr. E. W. Jones.

## FINANCE

The audited accounts of the Department will be published in the *Oxford University Gazette*. The following is a summary of income and expenditure for the year.

### GENERAL ACCOUNT

*Income.* Forestry Commission, £4,453; Colonies, £5,000; Colonial Development and Welfare Fund, £1,906; Curators of the University Chest, £5,302; Dominions, India and others, £1,033; other receipts, £299. Total Income, £17,993.

*Expenditure.* Staff Salaries and Pension Contributions, £13,838; Instructional Supplies, £951; Furniture, £498; Travelling, £1,102; Administrative and Miscellaneous Expenses, £1,088; Instalment on loan from Capital Account, £50. Total Expenditure, £17,527.

## APPENDIX I

## PUBLICATIONS

## SILVICULTURE:

- The Structure and Reproduction of the Virgin Forest of the N. Temperate Zone, E. W. Jones. *New Phytologist* 44: 130-148, 1945 (Review).
- The Regeneration of Douglas Fir. *Pseudotsuga taxifolia* Britt. in the New Forest. *Journal of Ecology* 33: 44-56, 1945.
- Research into problems of Tree Nutrition: review of work by Dr. Rayner *et al*, E. W. Jones. *Australian Forestry* 9: 52-6, 1945. (Written at request of the British Council.)
- Index of Diversity as applied to ecological problems, E. W. Jones. *Nature*, March 31st, 1945. (Letter.)

## FOREST BOTANY:

- Myrica Gale* L. J. P. M. Brenan. *Bot. Soc. and Exch. Cl. Brit. Isles*, 1943-4 Ref., 686-7 (1946).

## FOREST PATHOLOGY:

- A discussion of causes of dying-back of Corsican Pine with special reference to frost injury, W. Day. *Forestry*, XIX, 1945, pp. 4-26.
- The pathology of beech on chalk soils, W. Day. *Quart. Journal Forestry*, XL, 1946, pp. 72-82.
- Root disease in Conifers, W. Day. *Nature*, 158, 1946, p. 57.

## FOREST ECONOMICS:

- Rural Wages in England between 1824 and 1946. J. J. MacGregor (In Press).
- The Business Aspect of Forestry, J. J. MacGregor. (Printed by the Institute in connection with the Woodlands Accounting System.)

## FOREST UTILIZATION:

- The Operations of Military Forestry Units in France and Great Britain, 1939-44, Col. A. H. Lloyd. *Empire Forestry Journal*, Vol. 23, No. 1, 1944.
- Timber Supplies for the Allied Expeditionary Force, 1944-45, Col. A. H. Lloyd. *Empire Forestry Journal*, Vol. 24, No. 2, 1945.

## GENERAL:

- Champion, H. G. Genetics and forestry. *Quart. J. For.* 39, 2, 1945 (74-81).
- „ „ Genetics in forestry. *Emp. For. J.* 24 (1) 1945 (12-13).
- „ „ Forestry in the Food and Agriculture Organization. *Emp. For. J.* 24 (2), 1945 (131-5). Conf. ppr.
- „ „ International forestry. *Wood* 11 (3), 1946 (63-4).



## APPENDIX II

## LIST OF STAFF

## I. STAFF ENGAGED IN INSTRUCTION AND RESEARCH

- PROFESSOR H. G. CHAMPION, C.I.E., M.A. (Oxon.). Tropical Forestry, Forest Policy.
- \*L. CHALK, M.A., D.Phil. (Oxon.). Wood Structure and Properties.
- \*W. R. DAY, M.A., B.Sc. (Oxon.). Pathology, Forest Hygiene.
- \*A. H. LLOYD, O.B.E., M.C., T.D., M.A. (Oxon.). Forest Engineering and Utilization.
- \*\*R. N. CHRYSTAL, D.Sc. (Edin.), Hon. M.A. (Oxon.). Forest Zoology.
- †N. V. BRASNETT, M.A., Dip. For. (Cantab.). Forest Management and Mensuration.
- J. J. MACGREGOR, B.Sc. (Glasgow), M.S. (Wisc.), B.Litt. (Oxon.). Forest Economics.
- ‡E. W. JONES, M.A. (Oxon.), Ph.D. (Cantab.). Silviculture.
- W. R. C. HANDLEY, Ph.D. (Leeds). Microbiology.
- L. LEYTON, Ph.D. (Leeds). Tree Physiology.
- G. W. DIMBLEBY, M.A., B.Sc. (Oxon.). Forest Ecology.
- §J. P. M. BRENNAN, M.A. (Oxon.). Tropical Forest Botany.

## II. STAFF ENGAGED SOLELY IN RESEARCH FOR THE FORESTRY COMMISSION

- R. G. SANZEN-BAKER, B.Sc. (Edin.). Forestry Commission Research Officer for England and Wales. Silviculture.

## III. STAFF OF OTHER UNIVERSITY DEPARTMENTS ASSISTING IN INSTRUCTIONAL WORK

- A. C. HOYLE, M.A., B.Sc. (Oxon.). Forest Botany and Ecology.
- C. G. T. MORISON, M.A. (Oxon.). Soil Science.
- G. R. CLARKE, M.A., B.Sc. (Oxon.). Soil Science.
- O. H. CHILTON, M.A., M.Sc. (Lond.). Surveying.
- D. J. FINNEY, M.A. (Cantab.). Statistical Method.

## IV. OTHER STAFF

- Secretary-Accountant: Miss H. M. EDWARDS.
- Assistant Secretary: Miss J. M. POLLARD.
- Librarian: Miss G. GUINEY.
- Assistant Librarian: Miss I. S. T. ASPIN, M.A. (Oxon.).

\* These members of the Staff have the status of University Demonstrators, having been re-appointed as such with effect from 1/8/45 for five years.

\*\* Dr. R. N. Chrystal from 1/8/44 for three years.

‡ Dr. E. W. Jones from 1/8/45.

† Mr. N. V. Brasnett was appointed for one year from 1/10/45.

§ Mr. J. P. M. Brennan was re-appointed from 1/8/45.







